



The efficiency of prolotherapy in lateral epicondylitis

Prolotherapy in lateral epichondylitis

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Abstract

Aim: Lateral epicondylitis, is an overuse syndrome of the forearm extensor muscles. In this study, we aimed to investigate the effect of prolotherapy in patients with lateral epicondylitis in terms of pain, and function. **Material and Method:** This retrospective study comprised 23 consecutive patients above 18 years of age, who were diagnosed as lateral epicondylitis. Demographic data, VAS and DASH score were derived from chart review. **Results:** Our findings revealed that prolotherapy treatment lead to statistically significant improvement in pain and function. **Discussion:** Prolotherapy has been proposed as a potential therapy for chronic tendinitis and believed to produce a controlled inflammatory response and to stimulate an adequate fibroblastic proliferation and connective tissue repair. Pain reduction is also hypothesized to be related to the elimination of nerve fibers that are associated with neovessels or collagen fibril disruption and subsequent healing response. **Discussion:** Prolotherapy is a safe and effective alternative option for patients with refractory lateral epicondylitis.

Keywords

Lateral Epicondylitis; Prolotherapy; Tendinitis; Treatment

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Introduction

Lateral epicondylitis (LE), is an overuse syndrome characterized by the degenerative pathology of the forearm extensor muscles due to excessive and repetitive activities that lead to micro-tears in involved muscles. The incidence of LE varies from approximately 1% to 3% in the general population [1].

The pathology can be explained by angiofibroblastic hyperplasia focused on the degenerative process [2].

The treatment of LE is mainly conservative, approximately 95% of patients benefit from conservative treatment. Conservative treatment encompasses education and workplace ergonomic advice, deep tendon friction massage, mobilization and manipulations, physiotherapy applications, stretching/strengthening exercises, splints and orthoses, and local corticosteroid injections, botulinum toxin administration, autologous blood injection and extracorporeal shock wave therapy (ESWT) [3-8].

Prolotherapy (PrT) is a nonsurgical regenerative injection technique that triggers the natural healing process with local inflammatory response by applying small amounts of irritant hyperosmolar fluids in sessions of damaged soft tissue areas such as degenerated tendon insertions (entheses), joints, ligaments, and in adjacent joint spaces [9-10]. These irritant hyperosmolar fluids variously contain phenol, glycerine, or hypertonic glucose, mixed with local anesthetic, and aim to induce inflammation and deposition of collagen fibers in the weak ligaments. The aim of this study was to investigate the effect of prolotherapy in patients with lateral epicondylitis in terms of pain, and function.

Material and Method

This retrospective study is comprised of 23 consecutive patients above 18 years of age, who were diagnosed as lateral epicondylitis. A consecutive series of patients were performed. Inclusion criteria were as follows: pain on the lateral side of the elbow that was severe enough to interfere with their daily living activities (for less than 3 months), tenderness over the lateral epicondyle compared with that of the normal elbow, and pain during provocation of the lateral elbow pain with at least one of the following tests resisted middle finger extension, resisted wrist extension or passive stretch of wrist extensors.

Exclusion criteria were: cervical spondylosis, diabetes mellitus, arthritis in the upper extremities, previous treatment for ipsilateral LE within the last three months and bilateral LE, pregnancy, history of surgery, acute trauma in the elbow, osteoporosis, malignancy, hemophilia, neurological deficit(s) in the ipsilateral upper limb, and cognitive dysfunction. Demographic data of the subjects like age, duration of symptoms, previous treatments, and dominant hand were derived from chart review. Visual analog scale (VAS) was used to assess pain intensity in the last 24 hours. Functional assessment was done by DASH score.

Patients received injections of PrT solution as prepared 15% hypertonic dextrose. The solution consisted of 1cc 1% lidocaine, 5cc 30% hypertonic dextrose and 4 cc 0.9% isotonic.

The elbow was in 90 flexion and neutral rotation position as the patient lies supine. Using a 25- gauge 1.5- inch needle, PrT solution was injected into tendon insertions, with needle touching bone, at the supracondylar ridge, lateral epicondyle and the annular ligament for a total of 5ml. A peppering technique

was not used. Injections were applied at baseline, 4th and 8th weeks. Topical analgesia was not used. Patients were discouraged from using non-steroidal anti-inflammatory medications and starting new therapies. All evaluations were done prior to the treatment, 4 weeks and 12 weeks after the treatment. Oral/topical nonsteroidal antiinflammatory and analgesic medication intakes were forbidden during the study.

Statistical analysis

Statistical evaluation was performed using the SPSS 22.0 program. The mean, standard deviation, minimum and maximum values were used to define the data. Kolmogorov-Smirnov test was used to determine if the data were close to the normal distribution. The Wilcoxon test was used to compare the VAS values in the group and the t-test was used in the dependent groups to compare the DASH values. The $P < 0.05$ level was considered statistically significant.

Results

The study sample consisted of 23 adults (12 female and 11 male). Subjects' ages ranged from 19 to 64 years, with a mean age of $43.8 \pm SD 10.7$ years. Duration of elbow pain ranged from 0.5 years to 11 years ($\pm SD: 1.9 \pm 2.7$ years). Demographic features of the subjects are given in Table 1.

Table 1. Demographic features of the subjects

Age	43.8 \pm SD 10.7 years
Gender	
Female	12
Male	11
Symptom duration (year) (mean \pm SD)	1.9 \pm 2.7 years
Side of involvement	
Dominant hand	18
Non-dominant hand	5
Previous treatments	
Physical therapy	3
Using orthosis	2
Corticosteroid injection	4
Medical treatment	2
Kinesiotape	1
Untreated	11

A statistically significant improvement in the VAS scale was demonstrated; initial score 8.1 (± 1.3) (minimum: 6, maximum: 10), 1.5 ± 1.3 after 4 weeks from the last injection (minimum: 0, maximum: 5), and 1.1 ± 1.3 after 12 weeks from the last injection (minimum: 0, maximum: 4) ($P < 0.001$). A similar improvement was also noted in the DASH score; the initial score decreased to $31.7 (\pm 7.4)$ (minimum: 24.4, maximum: 51.1) 4 weeks after the last injection, $29.8 (\pm 9.2)$ (minimum: 22.4, maximum: 50.4) 12 weeks after the last injection from $78.6 (\pm 11.4)$ (minimum: 62.2, maximum: 99.3) ($p < 0.001$).

Discussion

Prolotherapy has been proposed as a potential therapy for chronic tendinitis and enthesopathies. Prolotherapy is believed to produce a controlled inflammatory response and to stimulate

adequate fibroblastic proliferation and connective tissue repair [11].

The mechanism of prolotherapy is an injection of hypertonic dextrose or an irritant solution that triggers a localized inflammatory cascade, similar to that which occurs in the normal healing process. The inflammatory cascade is initialized by osmotic rupture of local cells, by local cellular irritation, and sclerosing of pathologic neovascularity associated with tendinopathy. Another possible mechanism of prolotherapy is stimulation release of growth factors favoring soft tissue healing. [12-13] The localized inflammatory cascade stimulates fibroblastic hyperplasia and collagen formation that lead to tightening, thickening, and strengthening of the ligaments or tendons which, in turn, results in stronger connective tissue with improved biomechanics, joint function, and decreased pain [14-15].

Pain reduction is also hypothesized to be related to the elimination of nerve fibers that are associated with neovessels or collagen fibril disruption and subsequent healing response [16, 17, 18].

Prolotherapy has been assessed as a treatment for three tendinopathy disorders: Achilles tendinopathies and plantar fasciitis, and lateral epicondylitis. Maxwell et al. demonstrated a reduction in VAS pain scores in subjects injected with hyperosmolar (25%) dextrose under sonographic guidance for chronic Achilles tendinosis [19]. Yelland et al. conducted an RCT in symptoms related to Achilles tendinosis in subjects randomized to prolotherapy, eccentric loading exercises, and a combination group of prolotherapy and eccentric loading exercises [20]. Participants who received the combined treatment seemed to do better than those given either treatment alone. Ryan et al. assessed prolotherapy for chronic plantar fasciitis refractory to conservative care and demonstrated a reduction in VAS pain scores in subjects injected with hyperosmolar (25%) dextrose under sonographic guidance for plantar fasciitis. [21]

Scarpone et al. in their randomized controlled trial study on the effect of prolotherapy on resting elbow pain in at least 6 months of refractory LE, revealed improved pain scores, compared with control subjects [22]. This effect was maintained at long-term follow-up. In the current study, subjects who received prolotherapy also reported improved VAS and DASH score that maintained at a long term.

Carayannopoulos et al. in their randomized controlled trial (RCT) compared the efficacy of prolotherapy versus corticosteroid injection for the treatment of chronic lateral epicondylitis [23]. This RCT reported improvements within each of the 2 treatment groups over the course of the study, suggesting some degree of efficacy for both treatments. Improvements in the prolotherapy group suggested longer efficacy duration for prolotherapy. This finding is consistent with our results.

This study has some limitations which have to be pointed out. Our study design is retrospective and there is no control group. Another limitation particular to this study is that there are no specific standardized prolotherapy guidelines. The clinical studies show significant differences in treatment protocols. The proliferant solutions, doses and concentrations, treatment intervals and adjunct therapies used in studies vary [14].

In conclusion, PrT is a safe, economical and effective method that improves pain, patient satisfaction and functional status

in tendinopathies, particularly LE. Prolotherapy performed by a trained operator is a reasonable alternative option for patients with refractory lateral epicondylitis.

Scientific Responsibility Statement

The authors declare that they are responsible for the article's scientific content including study design, data collection, analysis and interpretation, writing, some of the main line, or all of the preparation and scientific review of the contents and approval of the final version of the article.

Animal and human rights statement

All procedures performed in this study were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. No animal or human studies were carried out by the authors for this article.

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Conflict of interest

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